

# PATENT ABSTRACTS OF JAPAN

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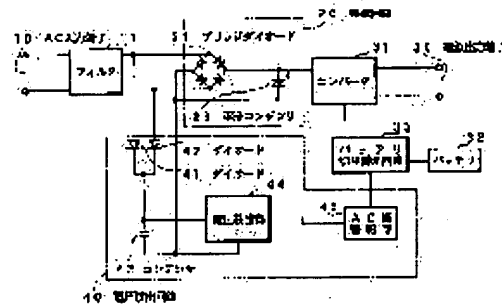
## (54) POWER SUPPLY VOLTAGE MONITORING CIRCUIT

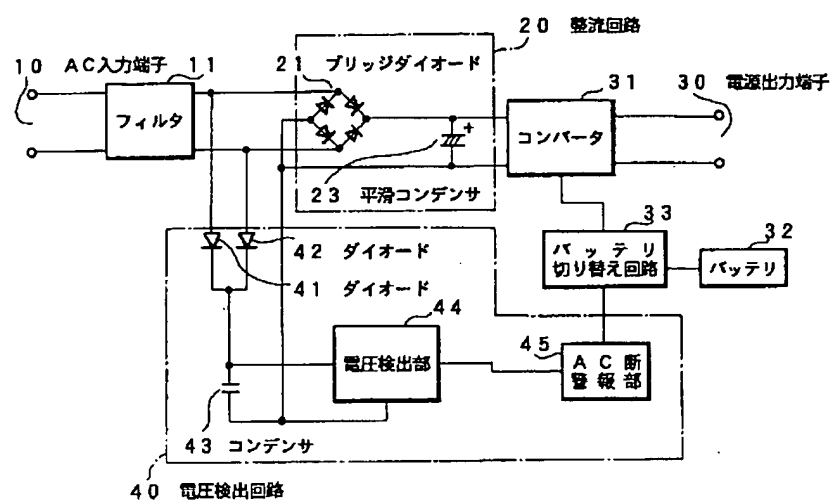
### (57)Abstract:

**PROBLEM TO BE SOLVED:** To monitor the feeding condition of AC voltage in real time by outputting an alarm signal, if the voltage value which is detected by a voltage detection means is a prescribed value or lower.

**SOLUTION:** This power supply voltage monitoring circuit is formed such that a voltage detection circuit 40 is connected to the previous stage of a rectification circuit 20, to detect the voltage value of AC voltage before rectification is conducted at the rectifying circuit 20. If the supply of the AC voltage to an AC input terminal 10 is stopped due to the generation of a trouble, power supply output voltage is continuously outputted from an power supply output terminal 30 for a while thereafter, by electric charges which are stored in a smoothing

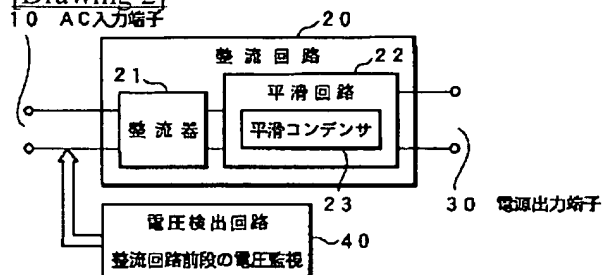
capacitor 23 in the power supply voltage monitoring circuit. If the supply of the AC voltage to the AC input terminal 10 is stopped, the apply of the AC voltage to diodes 41, 42 is stopped immediately after that. Therefore, a voltage value detected at a voltage detection part 44 becomes a prescribed value or lower, and an alarm signal is outputted from an AC interrupt alarm 45. As a result of this, it is possible to monitor the feeding condition of the AC voltage in real time.



Drawing selection drawing 1

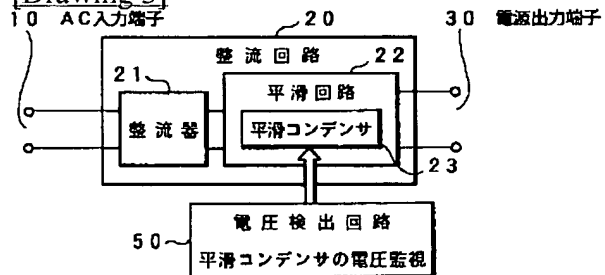
—実施形態の詳細な構成を示す回路図

[Drawing 2]



本発明の概要を示すブロック図

[Drawing 3]



従来例の概要を示すブロック図

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1. This document has been translated by computer. So the translation may not reflect the original precisely.
2. \*\*\*\* shows the word which can not be translated.
3. In the drawings, any words are not translated.

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TECHNICAL FIELD

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[Field of the Invention] This invention is used in the power unit which operates by electric supply of alternating voltage, and relates to the supply voltage supervisory circuit which supervises the electric supply condition of alternating voltage.

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TECHNICAL PROBLEM

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[Problem(s) to be Solved by the Invention] However, since the electrical-potential-difference detector 50 supervises the electrical-potential-difference value of a smoothing capacitor 23, even if supply of the alternating voltage to the AC input terminal 10 is lost, this is undetectable in the conventional supply voltage supervisory circuit mentioned above immediately. Since the smoothing capacitor 23 is storing the charge in the usual condition, this is for time lag to arise, after supply of alternating voltage is lost before the electrical potential difference of a smoothing capacitor 23 becomes below a predetermined value.

[0006] And the time lag will be changed according to conditions, such as an electrical-potential-difference value of the alternating voltage supplied, a class of smoothing capacitor 23, ambient temperature (capacity etc.), and an electrical-potential-difference value of the direct current voltage after conversion. Therefore, it is very difficult to compensate the delay of detection by processing control which predicted time lag in advance or foresaw the time lag.

[0007] Furthermore, in the conventional supply voltage supervisory circuit, when the electrical-potential-difference detector 50 outputs an alarm signal, the direct current voltage outputted from the power-outlet terminal 30 will also become below default value. Therefore, even if it performs the change of the supply origin of direct current voltage, the stop order of the feeder system-ed linked to the power-outlet terminal 30, etc. based on the alarm signal, in the feeder system-ed, the bad influence by temporary electrical-potential-difference drop may occur.

[0008] Then, this invention makes it possible to detect this immediately, even if supply of alternating voltage is lost, and it aims at offering the supply voltage supervisory circuit which can supervise the electric supply condition of alternating voltage on real time.

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EFFECT OF THE INVENTION

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[Effect of the Invention] As explained above, shortly after an electrical-potential-difference detection means detects the electrical-potential-difference value of the alternating voltage before rectification in a rectifier circuit is performed and the electrical-potential-difference value turns into below a predetermined value, an alarm means outputs an alarm signal in the supply voltage supervisory circuit of this invention. Therefore, if alternating voltage is no longer supplied to an input terminal, that will come to be understood immediately and will do so the effectiveness that the electric supply condition of alternating voltage can be supervised now on real time as a result.

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DESCRIPTION OF DRAWINGS

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## [Brief Description of the Drawings]

[Drawing 1] It is the circuit diagram showing the detailed configuration of an example of the gestalt of operation of the supply voltage supervisory circuit concerning this invention.

[Drawing 2] It is a block diagram explaining the outline of an example of the supply voltage supervisory circuit concerning this invention.

[Drawing 3] It is a block diagram explaining the outline of an example of the conventional supply voltage supervisory circuit.

## [Description of Notations]

10 AC Input Terminal

20 Rectifier Circuit

21 Bridge Diode (Rectifier)

23 Smoothing Capacitor

30 Power-Outlet Terminal

32 Dc-battery

33 Dc-battery Change Circuit

40 Electrical-Potential-Difference Detector

41 42 Diode

43 Capacitor

44 Electrical-Potential-Difference Detecting Element

45 AC \*\*\*\*\*

DETAILED DESCRIPTION

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] This invention is used in the power unit which operates by electric supply of alternating voltage, and relates to the supply voltage supervisory circuit which supervises the electric supply condition of alternating voltage.

[0002]

[Description of the Prior Art] Conventionally, as a supply voltage supervisory circuit, the thing as shown, for example in drawing 3 is known. This supply voltage supervisory circuit consists of electrical-potential-difference detectors 50 for supervising the electric supply condition to the AC input terminal 10 with which alternating voltage is supplied from current supply origin, the rectifier circuit 20 which rectifies the alternating voltage supplied to this AC input terminal 10, and is changed into direct current voltage, the power-outlet terminal 30 which outputs the direct current voltage changed in this rectifier circuit 20, and the AC input terminal 10.

[0003] Among these, a rectifier circuit 20 consists of a rectifier 21 which rectifies the alternating voltage supplied to the AC input terminal 10, and is made into a pulsating flow electrical potential difference, and a smoothing circuit 22 which graduates on the pulsating flow electrical potential difference made with this rectifier 21, and is made into fixed direct current voltage. In addition, the smoothing circuit 22 is constituted by the smoothing capacitor 23 for graduating on a pulsating flow electrical potential difference.

[0004] In the supply voltage supervisory circuit of such a configuration, it judges that the supply of the alternating voltage to the AC input terminal 10 of the electrical-potential-difference detector 50 was lost when the detection result became below the predetermined value set up beforehand, while having always detected the electrical-potential-difference value in a smoothing capacitor 23, and the alarm signal showing that is outputted. That is, in the conventional supply voltage supervisory circuit, when the electrical-potential-difference detector 50 supervises the electrical-potential-difference value in the smoothing capacitor 23 after rectifying alternating voltage, the electric supply condition to the AC input terminal 10 is supervised.

[0005]

[Problem(s) to be Solved by the Invention] However, since the electrical-potential-difference detector 50 supervises the electrical-potential-difference value of a smoothing capacitor 23, even if supply of the alternating voltage to the AC input terminal 10 is lost, this is undetectable in the conventional supply voltage supervisory circuit mentioned above immediately. Since the smoothing capacitor 23 is storing the charge in the usual condition, this is for time lag to arise, after supply of alternating voltage is lost before the electrical potential difference of a smoothing capacitor 23 becomes below a predetermined value.

[0006] And the time lag will be changed according to conditions, such as an electrical-potential-difference value of the alternating voltage supplied, a class of smoothing capacitor 23, ambient temperature (capacity etc.), and an electrical-potential-difference value of the direct current voltage after conversion. Therefore, it is very difficult to compensate the delay of detection by processing control which predicted time lag in advance or foresaw the time lag.

[0007] Furthermore, in the conventional supply voltage supervisory circuit, when the electrical-potential-difference detector 50 outputs an alarm signal, the direct current voltage outputted from the power-outlet terminal 30 will also become below default value. Therefore, even if it performs the change of the supply origin of direct current voltage, the stop order of the feeder system-ed linked to the power-outlet terminal 30, etc. based on the alarm signal, in the feeder system-ed, the bad influence by temporary electrical-potential-difference drop may occur.

[0008] Then, this invention makes it possible to detect this immediately, even if supply of alternating voltage is lost, and it aims at offering the supply voltage supervisory circuit which can supervise the electric supply condition of alternating voltage on real time.



[0009]

[Means for Solving the Problem] This invention is the supply voltage supervisory circuit thought out in order to attain the above-mentioned purpose. The input terminal with which alternating voltage is supplied from current supply origin, and a rectification means to rectify the alternating voltage supplied to said input terminal, It is characterized by coming to have an electrical-potential-difference detection means to detect the electrical-potential-difference value of the alternating voltage before connecting with the preceding paragraph of said rectification means and performing rectification with the rectification means, and an alarm means to output an alarm signal if the electrical-potential-difference value which said electrical-potential-difference detection means detected turns into below a predetermined value.

[0010] If alternating voltage is correctly supplied to the input terminal according to the supply voltage supervisory circuit of the above-mentioned configuration, the detection result of the electrical-potential-difference value in an electrical-potential-difference detection means will become the value for which it asks mostly. However, with an electrical-potential-difference detection means, since the electrical-potential-difference value of the alternating voltage before rectification with a rectification means is performed is detected, shortly after alternating voltage is no longer correctly supplied to an input terminal, the detection result of an electrical-potential-difference value becomes below a predetermined value. If the detection result in an electrical-potential-difference detection means becomes below a predetermined value, an alarm means will output an alarm signal. That is, in this supply voltage supervisory circuit, shortly after alternating voltage is no longer supplied to an input terminal, an alarm signal is outputted from an alarm means.

[0011]

[Embodiment of the Invention] Hereafter, based on a drawing, the supply voltage supervisory circuit concerning this invention is explained. Drawing 1 is the circuit diagram showing the example of the supply voltage supervisory circuit concerning this invention, and drawing 2 is the block diagram showing the outline of the supply voltage supervisory circuit. In addition, in drawing 1 and drawing 2, the same sign is given about the same component as the conventional thing (refer to drawing 3).

[0012] Here, in advance of explanation of the example of the supply voltage supervisory circuit of this invention, the outline of this supply voltage supervisory circuit is explained. It has the AC input terminal 10, a rectifier circuit 20, the power-outlet terminal 30, and the electrical-potential-difference detector 40 like the conventional thing, and the supply voltage supervisory circuit of this invention is constituted, as shown in drawing 2.

[0013] However, in this supply voltage supervisory circuit, unlike the conventional thing, the electrical-potential-difference detector 40 is connected to the preceding paragraph of a rectifier circuit 20, and the electrical-potential-difference value of the alternating voltage before rectification in a rectifier circuit 20 is performed is detected. Thereby, in this supply voltage supervisory circuit, since the detection result in the electrical-potential-difference detector 40 becomes below a predetermined value shortly after alternating voltage is no longer correctly supplied to the AC input terminal 10, when a detection result becomes below a predetermined value, the electrical-potential-difference detector 40 outputs the alarm signal showing that.

[0014] That is, in this supply voltage supervisory circuit, since an alarm signal is outputted from the electrical-potential-difference detector 40 shortly after alternating voltage is no longer supplied to the AC input terminal 10, the electric supply condition of alternating voltage can be supervised on real time as a result.

[0015] Next, the example of the configuration of the supply voltage supervisory circuit of this invention is explained, referring to drawing 1. In addition to the AC input terminal 10, the rectifier circuit 20, the power-outlet terminal 30, and the electrical-potential-difference detector 40, in this supply voltage supervisory circuit, the filter 11, the converter circuit 31, the dc-battery 32, and the dc-battery change circuit 33 are formed.

[0016] The AC input terminal 10 is connected to the input terminal of a filter 11 in the supply voltage supervisory circuit of such a configuration. A filter 11 passes the specific frequency component of the alternating voltage from the AC input terminal 10, or is made to intercept. This filter 11 has two output

terminals, and another input terminal of the bridge diode 21 is connected to another side for the input terminal of the bridge diode 21 which functions on one of these as a rectifier again, respectively.

[0017] The bridge diode 21 is connected to the plus terminal of a smoothing capacitor 23 and the input plus terminal of the converter circuit 31 with which the output plus terminal constitutes a smoothing circuit. Moreover, the output minus terminal of the bridge diode 21 is connected to the minus terminal of a smoothing capacitor 23, and the input minus terminal of the converter circuit 31.

[0018] The converter circuit 31 changes conversion of direct and an alternating current, a power line period, a source resultant pulse number, etc. to the direct current voltage after smoothing was performed by the smoothing capacitor 23, and the output terminal is connected to the power-outlet terminal 30.

[0019] By the way, in this supply voltage supervisory circuit, the electrical-potential-difference detector 40 consists of diodes 41 and 42, a capacitor 43, an electrical-potential-difference detecting element 44, and AC \*\*\*\*\* 45.

[0020] Diodes 41 and 42 are 2 terminal components which have rectification, and each anode terminal is connected between the output terminal of a filter 11, and the input terminal of the bridge diode 21.

Thereby, the electrical potential difference supplied to the AC input terminal 10 is impressed to the anode terminal of each diodes 41 and 42. Moreover, as for the cathode terminal of these diodes 41 and 42, each is connected to the output minus terminal of the bridge diode 21 through the capacitor 43.

However, the cathode terminal of diodes 41 and 42 is connected also to the electrical-potential-difference detecting element 44.

[0021] The electrical-potential-difference detecting element 44 has connected with the output minus terminal of the bridge diode 21, and detects the electrical-potential-difference value of the electrical potential difference impressed to diodes 41 and 42 while connecting with the cathode terminal of diodes 41 and 42. The output terminal of this electrical-potential-difference detecting element 44 is connected to AC \*\*\*\*\* 45.

[0022] AC \*\*\*\*\* 45 will output an alarm signal, if the detection result becomes below a predetermined value as compared with the predetermined value (threshold) beforehand set up in the detection result if the electrical-potential-difference value of the electrical potential difference on which the electrical-potential-difference detecting element 44 was impressed to diodes 41 and 42 is detected. This alarm signal is outputted to the dc-battery change circuit 33. However, an alarm signal may be outputted to the high order equipment which manages a supply voltage supervisory circuit.

[0023] Thus, it connects between the preceding paragraph 11 of the bridge diode 21, i.e., a filter, and the bridge diode 21, and the electrical-potential-difference detector 40 which consists of diodes 41 and 42, a capacitor 43, an electrical-potential-difference detecting element 44, and AC \*\*\*\*\* 45 detects the electrical-potential-difference value of the alternating voltage before rectification in a rectifier circuit 20 is performed.

[0024] Moreover, the dc-battery 32 and the dc-battery change circuit 33 which were established in this supply voltage supervisory circuit are for realizing the so-called battery-back-up function. A dc-battery 32 consists of the primary cell or rechargeable battery which has stored electricity direct current voltage beforehand. In addition, the direct current voltage which this dc-battery 32 is storing electricity is the same rating as the direct current voltage after being changed in the rectifier circuit 20. It has connected with the converter circuit 31, a dc-battery 32, and AC \*\*\*\*\* 45, and the dc-battery change circuit 33 changes whether based on the alarm signal from AC \*\*\*\*\* 45, the direct current voltage which the dc-battery 32 is storing electricity is supplied to the converter circuit 31.

[0025] Next, in the supply voltage supervisory circuit constituted as mentioned above, when alternating voltage is supplied to the AC input terminal 10, an example of operation in case alternating voltage is not supplied is explained.

[0026] In this supply voltage supervisory circuit, if the alternating voltage of a specified voltage value (for example, AC100V) is supplied to the AC input terminal 10 from current supply origin, after that alternating voltage passes a filter 11, it will be rectified by the bridge diode 21 and it will be further graduated mostly by direct current voltage with a smoothing capacitor 23. And after the direct current voltage after smoothing was performed is applied to the converter circuit 31, it is outputted from the

power-outlet terminal 30 as a power-outlet electrical potential difference (for example, DC5V and DC12V).

[0027] At this time, the alternating voltage supplied to the AC input terminal 10 is impressed to the diodes 41 and 42 of the electrical-potential-difference detector 40. If alternating voltage is impressed to diodes 41 and 42, the alternating voltage is rectified by diodes 41 and 42, and it will be inputted into the electrical-potential-difference detecting element 44 after smooth is carried out by the capacitor 43. That is, in the electrical-potential-difference detecting element 44, the electrical-potential-difference value of the alternating voltage impressed to diodes 41 and 42 is detected. Therefore, if alternating voltage is correctly supplied to the AC input terminal 10, since the detection result of the electrical-potential-difference value in the electrical-potential-difference detecting element 44 will serve as a value (regular value) for which it asks, the output of the alarm signal from AC \*\*\*\*\* 45 is not performed.

[0028] On the other hand, outputting a power-outlet electrical potential difference from the power-outlet terminal 30 after that in a supply voltage supervisory circuit with the charge currently stored in the smoothing capacitor 23, if alternating voltage is no longer supplied to the AC input terminal 10 by generating of the trouble of for example, current supply origin is continued for a while. However, shortly after supply of the alternating voltage to the AC input terminal 10 is lost, alternating voltage is no longer impressed to diodes 41 and 42 after that. Therefore, the electrical-potential-difference value detected by the electrical-potential-difference detecting element 44 becomes below a predetermined value (for example, value of a 20% decrease of a regular value), and an alarm signal is outputted from AC \*\*\*\*\* 45.

[0029] That is, in this supply voltage supervisory circuit, since an alarm signal is outputted from AC \*\*\*\*\* 45 shortly after alternating voltage is no longer supplied to the AC input terminal 10, the electric supply condition of alternating voltage can be supervised on real time as a result.

[0030] If an alarm signal is outputted from AC \*\*\*\*\* 45, the dc-battery change circuit 33 will be changed so that not the direct current voltage after smoothing was performed in the rectifier circuit 20 but the direct current voltage which the dc-battery 32 is storing electricity may perform the output from the power-outlet terminal 30 based on this alarm signal. Thereby, even if the electric supply to the AC input terminal 10 is lost, electric supply from a dc-battery 32 is performed promptly after that. And after electric supply is lost, the charge in a smoothing capacitor 23 is outputted for the time being. Therefore, in this supply voltage supervisory circuit, even if the electric supply to the AC input terminal 10 is lost, the power-outlet electrical potential difference from the power-outlet terminal 30 does not drop.

[0031] As mentioned above, in this supply voltage supervisory circuit, if it constitutes so that the electrical-potential-difference value of the electrical potential difference on which the electrical-potential-difference detecting element 44 was impressed to diodes 41 and 42 may be detected and the detection result in the electrical-potential-difference detecting element 44 becomes below a predetermined value while connecting diodes 41 and 42 and a capacitor 43 to the preceding paragraph of the bridge diode 21, AC \*\*\*\*\* 45 will output an alarm signal. Thereby, even if the electric supply to the AC input terminal 10 is lost, it becomes possible to detect this immediately and the electric supply condition of alternating voltage can be supervised on real time.

[0032] Therefore, if an electric supply condition is supervised by this supply voltage supervisory circuit, even if it is the case where the stop order of the feeder system-ed linked to the power-outlet terminal 30 etc. is controlled based on the alarm signal from AC \*\*\*\*\* 45, it is not necessary to take into consideration the time lag by the smoothing capacitor 23 storing the charge etc. and, and will not have a bad influence by temporary electrical-potential-difference drop to that feeder system-ed.

[0033] Furthermore, in this supply voltage supervisory circuit, if there is an alarm signal from AC \*\*\*\*\* 45, electric supply from a dc-battery 32 will be promptly performed after that by the change by the dc-battery change circuit 33. Thereby, even if the electric supply to the AC input terminal 10 is lost, a positive battery-back-up function is realizable. Moreover, by inputting the alarm signal from AC \*\*\*\*\* 45 into the dc-battery change circuit 33, it becomes possible to change into a solid state switch the dc-battery change circuit 33 which usually consists of diodes, and reduction of large loss can be aimed at now.

[0034] In addition, although it used with the power unit which outputs DC5V, DC12V, or DC24V grade to the input of AC100V and the suitable supply voltage supervisory circuit was explained with the gestalt of operation mentioned above, this invention is not limited to this. For example, if it operates by electric supply of alternating voltage, it is applicable even if it is other things. It is the last direct current voltage which would be mentioned above, and, specifically, alternating voltage may be outputted. Moreover, even if a motor, a heater, etc. are formed as an output means, and it does not output direct current voltage from a terminal as it is but it changes and outputs to other energy, it is applicable similarly.

[0035]

[Effect of the Invention] As explained above, shortly after an electrical-potential-difference detection means detects the electrical-potential-difference value of the alternating voltage before rectification in a rectifier circuit is performed and the electrical-potential-difference value turns into below a predetermined value, an alarm means outputs an alarm signal in the supply voltage supervisory circuit of this invention. Therefore, if alternating voltage is no longer supplied to an input terminal, that will come to be understood immediately and will do so the effectiveness that the electric supply condition of alternating voltage can be supervised now on real time as a result.

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CLAIMS

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## [Claim(s)]

[Claim 1] The input terminal with which alternating voltage is supplied from current supply origin, and a rectification means to rectify the alternating voltage supplied to said input terminal, The supply voltage supervisory circuit characterized by coming to have an electrical-potential-difference detection means to detect the electrical-potential-difference value of the alternating voltage before connecting with the preceding paragraph of said rectification means and performing rectification with this rectification means, and an alarm means to output an alarm signal if the electrical-potential-difference value which said electrical-potential-difference detection means detected turns into below a predetermined value.

[Claim 2] The supply-voltage supervisory circuit according to claim 1 characterized by to establish an output means to output the supply voltage after rectification with said rectification means, an accumulation-of-electricity means by which direct current voltage is stored electricity beforehand, and a change means change to the supply voltage after said rectification, and make the direct current voltage within said accumulation-of-electricity means output to said output means when there is an output of the alarm signal by said alarm means.